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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/806,980
Filing Date: March 22, 2004
Appellant(s): CHEUNG ET AL.

William P. Jensen

For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed 11/28/2008 appealing from the Office action mailed 10/9/2007.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

HOLDEN, PAUL, VoxelGeo 1.1.1; User's Guide, March 1994; Vital Images Inc., pp. 1-461.

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-52 are rejected under 35 U.S.C. 103(a) as being unpatentable over Holden (VoxelGeo 1.1.1, Productivity Tool for Geosciences).

As per claim 1, Holden teaches the claimed "program storage device readable by a machine, the device tangibly embodying a program of instructions executable by the machine to perform method steps of imaging a three-dimensional (3D) volume", the method steps comprising: "creating one or more three-dimensional (3D) sampling probe(s), wherein each 3D sampling probe is a sub-volume of the 3D volume" (Holden, Editing the Volume, page 9-19; working on a sub-volume; page 6-4, the subvolume will allows the process speed increase due to the reduction in processed data;); "drawing an image of the 3D sampling probe(s), the image comprising an intersection of the 3D sampling probe(s) and the 3D volume" (Holden, figure shows the sub-volume in page 9-21); and "repeating the drawing step responsive to movement of the 3D sampling

probe(s) within the 3D volume so that as the 3D sampling probe(s) moves through the 3D volume" (Holden, Editing along the selected axis; page 9-22). It is noted that Holden does not teach "the image of the 3D sampling probe(s) is redrawn substantially at the same time as the 3D sample probe is moved." However, since Applicant's reason of a fast redrawing speed is reduction of processed data (i.e., using sub-volume instead of whole volume), it is just a trade off between the processing speed and the amount of processed data (Holden mentions that in page 6-4). Furthermore, the "sample probe" is interpreted as a position locator which defines the coordinates of a sample within the volume which is equivalent to Holden's GeoSeed (page 8-16). Applicant's arguments on the slider bar is not correct because the slider bars are used to adjust the size of the sub-volume, which is associated with the sample probe, but not the sample probe itself. Since Holden's disclosure of movement of Geo Seed (page 8-16) is always associated with input from a user, drawing is always associated with providing perception to a user, and concurrency is always described as sufficiently fast to be perceived as real-time by the user, the redrawing steps are equivalent. Thus, it would have been obvious to provide the sample probe at substantially the same time as the probe is moved for the purpose of enhancing the interaction of the user to viewing the 3D voxel data.

Claim 2 adds into claim 1 "repeating the drawing step to reshape the 3D sampling probe(s) so that as the 3D sampling probe(s) is changed in shape, the image of the 3D sampling probe(s) is redrawn substantially at the same time" (Holden, Editing the volume; page 9-19).

Claim 3 adds into claim 1 “the image of the 3D sampling probe(s) is redrawn at a frame rate of at least about 10 to 15 frames per second” which Holden does not teach. However, Holden’s video interface for a “smooth” displaying indicates the generation of a plurality of frames about 10-15 per second as claimed.

Claim 4 adds into claim 1 “extracting from the 3D volume a sub-volume data set corresponding to the surfaces of the 3D sampling probe(s); and texture mapping the sub-volume data set onto the surfaces of the 3D sampling probe(s)” which is obvious for displaying of 3D volume on the screen (official notice).

Claims 5-8 add into claims 1 and 2 “repeating the drawing step to rotate, independently or dependently, a 3D orientation of the 3D volume and the 3D sampling probe(s) so that as the 3D orientation is changed, the image of the 3D sampling probe(s) is redrawn substantially at the same time” which is obvious for translating two interrelated volumes in the screen (official notice).

Claim 9 adds into claim 1 “drawing an image of an intersection of one of the 3D sampling probes with another one of the 3D sampling probes” (Holden, modifying the probe into any shapes which can be an intersection of two larger probes; pages 9-19 to 9-21).

Claim 10 adds into claim 9 the one of the 3D sampling probe(s) is a data probe and the another one of the 3D sampling probe(s) is a substantially transparent cut probe that cuts out a 3D sub-section of the data probe so that the image of the intersection of the data probe and the cut probe comprises an intersecting surface internal to the data probe" (Holden, modifying the probe into any shapes which can be an intersection of two larger probes; pages 9-19 to 9-21; the transparency property is well known – official notice - in displaying the volumes on screen).

Claim 11 adds into claim 10 "drawing an image of a third 3D sampling probe, wherein the third 3D sampling probe is volume rendered at least partially within the 3D sub-section of the data probe" (Holden, modifying the probe into any shape which can be partially within another probe; pages 9-19 to 9-21).

Claim 12 adds into claim 1 "dividing the image of the 3D sampling probe(s) into a plurality of over-lapping sub-images; and simultaneously drawing the plurality of over-lapping sub-images, thereby increasing a field-of-view to the user" which is obvious for displaying several volume on a screen (official notice).

Claim 13 adds into claim 1 "the 3D volume is defined by a data set of voxels, each voxel expressed in the form of x, y, z, data value" (Holden, figure in page 9-21).

Claim 14 adds into 13 “data selected from the group comprising seismic data, remote sensing data, well log data, gravity and magnetic field data, sidescan sonar image data, temperature, pressure, saturation, reflectivity, acoustical impedance and velocity” (Holden, seismic data; page 9-21).

Claim 15 adds into claim 13 “extracting from the 3D volume a sub-volume data set corresponding to the 3D sampling probe(s); and volume rendering the sub-volume data set in accordance with a transparency setting that is a function of each data value, thereby volume imaging the 3D sampling probe(s)” (Holden, modifying the probe into any shapes which can be an intersection of two larger probes; pages 9-19 to 9-21; the transparency property is well known – official notice - in displaying the volumes on screen).

Claim 16 adds into claim 13 “identifying a seed point, wherein the seed point is a voxel within the data set of voxels that defines one of the 3D sampling probe(s); and defining a selection criteria based on the data values, the drawing step being carried out to image selected points only within the 3D sampling probe, wherein the selected points are connected to the seed point, and the data values of the selected points satisfy the selection criteria” (Holden, GeoSeed; page 9-19).

Claim 17 adds into claim 16 “the 3D sampling probe containing the seed point is

an auto picking 3D sampling probe" (Holden, GeoSeed; page 9-19); wherein the repeating step is carried out so that as the auto picking 3D sampling probe moves through the 3D volume, the image of the selected points is redrawn within at least one of the auto picking 3D sampling probe and the 3D volume substantially at the same time" (Holden, subset the volume data; pages 9.19 to 9.22).

Claim 18 adds into claim 17 "the repeating step is carried out so that as the auto picking 3D sampling probe moves through the 3D volume, the image of the selected points is redrawn only within the auto picking 3D sampling probe substantially at the same time" (Holden, subset the volume data; pages 9.19 to 9.22).

Claim 19 adds into claim 17 "defining an eraser 3D sampling probe; and defining a de-selection criteria based on data values, wherein the repeating step is carried out so that as the eraser 3D sampling probe moves through the selected points that satisfy the de-selection criteria, the selected points that satisfy the de-selection criteria are deleted from the image substantially at the same time" which is obvious for editing the 3D volume objects on computer graphics (official notice).

Claim 20 adds into claim 1 "the image of the 3D sampling probe(s) is redrawn substantially at the same time as the 3D sampling probe(s) moves through the 3D volume so that a user-selected feature defined by the data values is at least partially visualized." The reasonable interpretation is that the image is redrawn substantially at

substantially the same time as the sampling probe is moved. Since Holden's disclosure of movement, in page 9-22, is always associated with input from a user, drawing is always associated with providing perception to a user, and concurrency is always described as sufficiently fast to be perceived as real-time by the user, the redrawing steps are equivalent. Thus, it would have been obvious to provide the sample probe at substantially the same time as the probe is moved for the purpose of enhancing the interaction of the user to viewing the 3D voxel data.

Due to the similarity of claims 21-26 to claims 1-20, they are rejected under the same reason.

Claims 27-52 are identical to claims 1-26 except in claims 1, 21, 24, the language of "the image of the 3D sampling probe(s) is redrawn substantially at the same time" and in claims 27, 47, and 50, "the image of the 3D sampling probe(s) is redrawn in real time" which so close in content that they both cover the same thing; therefore, they are rejected under the same reason.

(10) Response to Argument

Applicant invention teaches movement of 3D sampling probe(s) within a 3D volume in which the image of the 3D sampling probes(s) is redrawn substantially at the same time (or sufficiently fast to be perceived in real time) as the 3D sampling probe(s) is moved. Applicant defines "movement of the 3D sampling probe within the 3D volume

as 'a change in the shape, size or location of the 3D sampling probe within the 3D volume (Disclosure, [0052]).

Holden's sampling probe is described in chapter 9. Editing the Volume in which an updated sub-volume of the 3D volume (i.e., the claimed "sampling probe") is manipulated "in shape, size, or location" within the 3D volume (Holden, the options in the Edit Volume, page 9-1). Specifically, for example, Holden's use of Orthogonal Planes to filter out the outside voxels defines within the 3D volume a sampling probe whose location is changed according the movement of the orthogonal planes (Holden, page 9-19, lines 3-5). Furthermore, in combination of a use in GeoSeed which picks an arbitrary voxel (Holden, page 8-16, Choose a seed voxel, line 17) within the 3D volume to create a volume of related voxels (Holden, page 8-15), the Orthogonal Planes limits to a sub-volume containing the selected voxel (Holden, page 9-19, lines 15-17). So, using the Orthogonal Planes either in combine with the GeoSeed or just by manipulating positions of the orthogonal planes, Holden creates images of the 3D sampling probe as the 3D sampling probe is moved (i.e., located at different positions) within the 3D volume.

Claim 1 requires "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) moves through the 3D volume, the image of the 3D sampling probe(s) is redrawn substantially at the same time as the 3D sampling probe is moved." Independent claims 21 and 24 contain nearly the same identical limitations.

Independent claim 27 requires "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume so that as the 3D sampling probe(s) moves through the 3D volume, the image of the 3D sampling probe(s) is redrawn sufficiently fast to be perceived in real time as the 3D sampling probe is moved." Independent claims 47 and 50 contain nearly the same identical limitations.

Applicant concurs that the claimed phrase "the 3D sampling probe moves through the 3D volume" is "a change in the shape, size or location of the 3D probe within the 3D volume" (Appeal Brief, page 18, lines 20-23). As argued above, Holden's Editing Volume by Orthogonal Planes, either in combine with the GeoSeed or by just manipulating positions of the orthogonal planes, creates images of the 3D sampling probe as the 3D sampling probe is moved within the 3D volume, in which the "movement of the probe" is caused by the manipulation of the orthogonal planes' positions or the position of the picked seed voxel.

Holden teaches the displayed 3D volume having adjustable rendering parameters in which the user interface moves among these parameters making adjustments and seeing the results in the rendered image immediately (Holden, page 5-2, lines 20-24). In teaching the Editing Volume by Orthogonal Planes (i.e., the movement of the 3D sampling probe), Holden shows the image of the 3D sampling probe (Holden, page 9-21, volume in the top left of the displayed window) which is redrawn correspondent to the movement of the 3D sampling probe (Holden, quoted "The volume in the rendering window reflects the edits) which is equivalent to the

claimed "image of the 3D sampling probe is redrawn as the 3D sampling probe is moved".

So, both of the claimed invention and Holden system have the same steps (i.e., creating a 3D sampling probe, drawing the image of the 3D sampling probe, repeating the drawing step as the probe is moved), the only claimed feature Holden fails to mention is the processing speed of the image generation; specifically, the image of the 3D sampling probe(s) is redrawn **substantially at the same time** (emphasis added) as the 3D sampling probe is moved (claims 1, 21, 24); or the image of the 3D sampling probe(s) is redrawn **sufficiently fast to be perceived in real time** (emphasis added) as the 3D sampling probe is moved (claims 27, 47, 50).

Beside the well known trade off between processing speed in generating images and reducing data volume (e.g., Holden, page 6-4, complex volume requires more time to render), Holden does teach the displayed 3D volume having adjustable rendering parameters in which the user interface moves among these parameters making adjustments and seeing the results in the rendered image immediately (Holden, page 5-2, lines 20-24). More specific, Holden teaches "the 3D sampling probe on the display reflects the movement of the 3D sampling probe" which is implemented by slide bars (page 9-21).

Applicant argues that since Holden must "press and hold the left mouse, then move the mouse to the desired setting, release the mouse button" before the image is redrawn, Holden does not teach "substantially at the same time" or "sufficiently fast to be perceived in real time" feature in the independent claims. This argument is not

persuasive because of two (2) reasons. First, the claimed "3D sampling probe is moved," is interpreted as Holden's action including "press and hold the left mouse, then move the mouse to the desired setting, release the mouse button," not during pressing and moving the mouse. Second, furthermore, Holden does teach "the double buffer feature" in which "rendering is done in the background and each new image is then drawn on the screen with the new setting in effect. You can move the slider across its entire range and quickly view the range of change at regular intervals without releasing the mouse and letting the image re-render at various points" (Holden, page 5-10, lines 12-19); therefore, the claimed "substantially at the same time" or "sufficiently fast to be perceived in real time" feature is taught in Holden's "quickly view the range of change."

For claims 3 and 29, which require "the image of the 3D sampling probe is redrawn at a frame rate of at least 10-15 frames per second." Applicant argues "redrawn" in claims 3 and 29 must be interpreted as "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume" which is not persuasive. Although dependent upon claim 1, there is nothing to show a connection between the "redrawn" step in claim 3 to the claimed "repeating the drawing step responsive to movement of the 3D sampling probe(s) within the 3D volume." So, the claimed ""the image of the 3D sampling probe is redrawn at a frame rate" is interpreted as the frame rate, which is known in the art as the number of times the screen frame being redrawn each second on a display device; (usually, 25-60 frames per second) as used in Holden's video options for animation. Furthermore, Holden's "viewing the range of change at regular intervals" (page 5-10, lines 12-19) allows the user to view a number

of frames during a period of time; therefore, the claimed "10 to 15 frames per second" of claim 3 and 29 would have been a mere design choice because it depends on the processing speed of the system as well as the size of the displayed volume.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

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